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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/059,321	01/31/2002	Chuan Lin	2001 P 14585 US	5538

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EXAMINER

ISAAC, STANETTA D

ART UNIT PAPER NUMBER

2812

DATE MAILED: 03/13/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/059,321

Applicant(s)

LIN, CHUAN

Examiner

Stanetta D. Isaac

Art Unit

2812

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kunikyo, U.S. Patent 6,333,232 in view of Son et al. Patent Number 5,904,538.

3. Kunikiyo discloses a semiconductor process substantially as claimed. See **FIGS. 1-60** where Kunikiyo teaches a process of fabricating a narrow channel width PMOSFET device, the improvement of affecting reduction of negative bias temperature instability by use of F2 side wall implantation, comprising:

a) forming a shallow trench isolation (STI) region **80** in a substrate **1** having a pad oxide and a nitride layer on it's surface;

b) forming a gate **14** on a gate oxide **13** in said substrate;

c) forming a liner layer **8** in said shallow trench isolation region and subjecting said liner layer to oxidation to form a STI liner oxidation layer;

and

e) filling the STI F₂ implanted structure from step d) with a high density plasma (HDP) fill to affect reduction of negative bias temperature instability and enhance gate oxidation at the STI corner.

However, Kunikiyo fails step d) implanting F₂ into side walls of said STI liner oxidation layer at a large tilted angle in sufficient amounts to affect reduction of negative bias temperature

Art Unit: 2812

instability and enhanced gate oxidation at the STI corner after a high density plasma fill of said STI F₂ implanted liner oxidation layer. See FIGS. 1A-2H where Son teaches d) implanting F₂ into side walls of said STI liner oxidation layer at a large tilted angle with reference to the Y axis (see) in sufficient amounts to affect reduction of negative bias temperature instability after a high density plasma fill of said STI F₂ implanted liner oxidation layer. In view of Son, it would have been obvious to one of ordinary skill in the art to incorporate the process step of Son into the Kunikiyo semiconductor process because of preventing a hump phenomenon for forming a trench having rounded corners, in addition, a tilt ion implantation process can be formed where fluorine ions can be used for the purpose of contaminating a crystal structure of the semiconductor substrate. (col. 1 lines 50-67; col. 2 lines 21-45)

4. Pertaining to claim 2, Kunikiyo teaches the process of claim 1 wherein said substrate is Si.

5. Pertaining to claim 3, Kunikiyo teaches the process of claim 2 wherein said liner oxidation layer is SiO₂.

6. Pertaining to claim 4, Kunikiyo teaches the process of claim 2 wherein said liner oxidation layer is SION.

7. Pertaining to claim 5, 7, and 8 the combined teachings fail to teach the process of claim 3.

Kunikiyo fails to disclose the process of claim 7, wherein said sufficient

amount of F₂ is a dose of from about 5×10^{12} to about $1 \times 10^{14} \text{ cm}^2$

Given the teaching of the references, it would have been obvious to determine the optimum thickness, temperature as well as condition of delivery of the layers involved. See *In re Aller, Lacey and Hall* (10 USPQ 233-237) "It is not inventive to discover optimum or workable

Art Unit: 2812

ranges by routine experimentation. Note that the specification contains no disclosure of either the critical nature of the claimed ranges or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Any differences in the claimed invention and the prior art may be expected to result in some differences in properties. The issue is whether the properties differ to such an extent that the difference is really unexpected. *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986)

Appellants have the burden of explaining the data in any declaration they proffer as evidence of non-obviousness. *Ex parte Ishizaka*, 24 USPQ2d 1621, 1624 (Bd. Pat. App. & Inter. 1992).

An Affidavit or declaration under 37 CFR 1.132 must compare the claimed subject matter with the closest prior art to be effective to rebut a prima facie case of obviousness. *In re Burckel*, 592 F.2d 1175, 201 USPQ 67 (CCPA 1979).

8. Pertaining to claim 6, Kunikiyo teaches the process of claim 4 wherein said large tilted angle is from about 10 to about 30 degrees with reference to the Y axis.
9. Pertaining to claim 9, Kunikiyo teaches the process of claim 7 wherein said high density plasma (HDP) fill is a HDP oxide fill.
10. Pertaining to claim 10, Kunikiyo teaches the process of claim 8 wherein said high density plasma (HDP) fill is a HDP oxide fill.

Conclusion


11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stanetta D. Isaac whose telephone number is 703-308-5871. The examiner can normally be reached on Monday-Friday 7:30am -5:30pm.

Art Unit: 2812

12. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Nebling can be reached on 703-308-3325. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-3432 for After Final communications.

13. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Stanetta Isaac
Patent Examiner
March 8, 2003


John F. Niebling
Supervisory Patent Examiner
Technology Center 2800